

# **The Production Planning Practices and Techniques Impact on Operational Costs in South African Manufacturing industries.**

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## **Abstract**

This study aimed to look into the impact of production planning practices and techniques as a fundamental role of product management in a manufacturing organization's operational costs. The study takes a closer look at the production process in manufacturing organizations in Johannesburg. The following objectives were listed: (1) to determine the outcomes of the organization's production planning practices and techniques, and (2) to evaluate the techniques of production planning execution on organizational efficiency, and lastly (3) to investigate the impact of production planning on the organization's productivity. The research followed a quantitative approach from a case study. Data was gathered using questionnaires that were administered to operational staff, supervisors, and middle management employees in the Company under study. The study population included all production planning employees and their supervisors and managers in one of the South African manufacturing industries. The study's findings revealed that the practices and approaches were applied and significantly impacted the overall outcome. Although the results indicated that the production department was efficient, not every department area was efficient.

## **Keywords**

Production planning, Production practices, Operational costs, South Africa, Manufacturing industries

## **1. Introduction**

Hamzeh (2009) states that production planning is the act of creating a roadmap for the design and production of a product or service. Production planning aids businesses in making their manufacturing processes as efficient as possible. It is the only aspect of production that addresses the fundamental principles of what will be produced, when, and how much it will cost to make it (Bendul and Blunck, 2019). Production planning is critical because it establishes an efficient production process that is tailored to the needs of customers and organizations. It improves customer-dependent procedures like on-time delivery as well as customer-independent methods like production cycle time. Production planning must be effective as ever for a manufacturing business or organization to be successful (Schuh et al., 2017). Regardless of the structure, a lack of an efficient production planning strategy will make production impossible. In general, the production planning process entails creating a plan that satisfies customers to result in a profit.

### **1.1 Problem statement**

In most manufacturing industries, production remains a challenge. The fact that most manufacturing industries cannot plan for production properly is a problem because it will result in low-quality productions (Altaf et al., H., 2018). The production line frequently slows down and affects other elements, making it difficult to effectively carry out the production schedule. All of this will lead to production failure in the long run, resulting in market production failure and a loss of competitive advantage. Suppose the organization cannot properly execute production planning practices and techniques. In that case, there will be a waste of raw materials and resources and high operational costs, which will impact the manufacturing budget. As a result, this research delves into analyzing and appraising the relationship between production planning and operational costs and observing how proper production planning affects organizational expenses in the manufacturing business.

### **1.2 Aim of the study**

This study aims to assess the impact of production planning practices and techniques as a fundamental role of product management in a manufacturing organization's operational costs

### **1.3 Objectives**

Main Objective

The study's primary goal is to analyze the influence of production planning on the Company's operational costs.

Sub Objectives

The study's complementary objectives are: (1) to determine the outcomes of the organization's production planning practices and techniques, and (2) to evaluate the techniques of production planning execution on organizational efficiency, and lastly (3) to investigate the impact of production planning on the organization's productivity.

### **1.4 Scope of the study**

The study takes a closer look at the production process in manufacturing organizations in Johannesburg. The central part of the production analyzed has been acquiring raw materials to deliver the final product.

### **1.5 Value of the study**

Identifying ways to improve production has always been the objective of all organizations, especially amidst such great global competition. Hence, this study comes in as a significant contribution to the literature on production in manufacturing companies in South Africa. In addition, the study links the literature to the actual practices on the ground in production.

## **2 Literature Review**

### **2.1 Production meaning**

Production is the process of combining numerous material inputs to make something that can be consumed (Monostori et al. 2010). The term "production" simply refers to the state of being helpful, valuable, or profitable. It is the set of methods and procedures for transforming intangible and tangible assets into tangible goods and services. Market production, public production, and household production are the three most important types of production. In its broadest sense, market production refers to creating a product or service that is intended to be sold for a profit in a marketplace (Duernecker & Herrendorf, 2018). Market production refers to all units of production that sell the majority, if not all, of their output at an acceptable and economically significant price. Household production is defined as creating goods and services for personal use by household members using their capital and unpaid labor (Duernecker & Herrendorf, 2018). The transformation of purchased intermediate materials into final consumption products is part of the household manufacturing process. Cichos and Aurich (2016) stated that production is the arranged activity of transitioning resources into final products, resulting in either goods or services. Its objective is to satisfy the request for such transformed inputs. Production refers to activities that are administered to fulfill other people's wants via exchange (Rauchet et al. 2018). What is produced should be designed to satisfy customer wants.

## 2.2 Forms and Methods of Production

There are three significant categories of production in which businesses engage (JSSCE and production, 2021). Extractive sectors such as forestry, agriculture, fishing, oil extraction, and mining are responsible for primary production. The industries as mentioned earlier, are engaged in activities such as harvesting nature's gift from the earth's surface, beneath its surface, and inside the waters. Secondary production occurs in the manufacturing industry when semi-finished materials or products are transformed into finished goods, such as changing ore iron into finished steel or turning a floor into a cake. Tertiary production: the industries involved in this sort of production sector; produce all of the services that allow finished items to reach customers. These services are provided to a wide range of industry-related businesses as well as directly to clients.

When it comes to production alternatives, there are various manufacturing processes to choose from, each with its own set of advantages depending on the type of product and market size (The Five Types of Manufacturing Processes | Katana, 2021)). They are as follows:

- (1) Job Production Method — This method is commonly used to manufacture highly specialized and high-quality products, such as expensive Rolex watches. The job production technique necessitates a specific set of abilities based on the product being produced and concentrates on one item at a time. As a result, it takes longer to hire manufacturing personnel, and the skills required can be challenging to find. Artisan and handicraft brands frequently use it to create their preferred items, however at a slower pace and usually for a small group or a single customer
- (2) Batch Production Method – A plant produces a small batch of a specified group of pieces or finished products. Small businesses frequently use this type of production process since it allows them to reduce their initial capital cost. Because standardization occurs from designs to materials, the batch approach simplifies quality control and production schedule management. Most of the time, batch production methods are used to create pieces of an entire product that goes through multiple phases before being finalized, giving the producer the ability to generate many products in various varieties.
- (3) Flow Production Method – It is most likely involved in manufacturing complex products such as furniture or kitchen appliances. Individual parts or sub-assemblies are sent from one manufacturer to the next until the final product is produced using the flow production process. As a result, production lines at every stage of the final product's manufacturing cycle can continue to work without interruption, even if another line needs to be reassembled.
- (4) Mass Production Method - Mass production, which occasionally employs flow production, eliminates the challenges of batch manufacturing downtime. It is generally difficult to apply this type of strategy for new businesses or those who operate in segmented markets because it becomes cost-effective only when creating big quantities of comparable products. The method's concepts can be applied to a wide range of products, including food, fuel, minerals, chemicals, and huge parts like binders and individual parts assemblies like those found in household appliances and automobiles. Mass productions are frequently nearly totally automated, requiring only a small number of people to monitor the entire process while performing random quality checks. Although robust quality control can be challenging to achieve due to the nature of this approach procedure, while the defect rate tends to increase, producing large quantities can mean that the individual unit price will be greatly reduced.

## 2.3 Factors of Production

Developing a good or service necessitates applying specific resources or production factors (Dean and Kretschmer, 2007). The table below depicts how these factors are classified and how they differ from one another.

Table 1. Factors of Production

Name	Nature	Reward
Land	Any Natural resource	Rent
Labour	Effort and/skills	Wages
Capital	Manmade Resources	Interest
Enterprise	Organizing and risk-taking	Profit

Early political economists such as David Ricardo, Adam Smith, and Karl Marx established land, labor, and capital as factors of production, according to Adam Hayes (2020). Capital and labor have remained the two primary inputs for production processes to this day. The study examines each of them in depth below.

Land as factor: As a factor of production, land can take several forms, ranging from agricultural land to commercial real estate to a specific piece of land with sufficient resources. Natural resources such as oil and gas can also be gathered and cleaned for human consumption from the soil. Farmers' crop cultivation on the land enhances the value of the land.

Labour as a factor: A person's labor can be described as their work to bring items or services to market. It can manifest itself in a variety of ways (Novotná and Volek, 2014). A construction worker on a hotel site, like the waiter who serves the guests or the receptionist who registers those same customers, is part of the labor force. The work done by project personnel is referred to as labor in the software industry.

Capital as a factor: Capital is commonly referred to as money in economics. Money cannot be considered one of the components of production because it is not directly involved in producing goods or providing services (Ball et al. 2008). However, it simplifies production processes by allowing entrepreneurs and business owners to purchase capital goods, land and pay wages. The purchase of things with money earned from production is referred to as capital as a factor of production. Buying a tractor for farming, for example, is a capital investment.

Entrepreneurship as a factor: The hidden flavor ties all of the other aspects of production together to create a finished product or service for the consumer market. The rise of social media behemoth Facebook Inc. is an excellent example of entrepreneurship (FB). Mark Zuckerberg absorbed the risk of his social media network's failure or success by devoting time from his daily schedule to develop a viable product himself. Labor became his sole factor of production. Mark Zuckerberg had to hire two individuals and the co-founder to expand the product, and then the invested time became a factor of production. He raised venture capital funds to construct its own office space and data centers following the product's success, which necessitated significant real estate. The land became a factor of production.

## **2.4 Production planning**

The arrangement of production and manufacturing components in a company's industry is known as production planning (Mula et al.2006). It used the allocation of resources for staff activities, materials, and manufacturing capacity to accomplish duties for various clients. According to Chapman (2006), production planning is the process of anticipating each step in a long chain of independent activities; actions must be conducted in the correct place at the appropriate time, and each operation must be completed as efficiently as possible. The big picture of production planning is how things are going to be in the future. It will assist in setting up a production site by making it easy to obtain the requirements. The only efficient organization allows for the most effective planning and strategy for the manufacturing process, which is the fundamental mechanism for converting raw materials into completed goods or services. (Graves, 2011). The planning horizon is a regularly defined period during which a production plan is established. When it comes to creating a production plan, the production planner, planning manager, or entire production planning department must collaborate with the marketing and sales departments to develop a sales projection or an extensive list of customer orders.

The most important aspect of production planning has been the correct evaluation of the productive capacity of available resources, even though this is one of the most challenging things to master. As a result, production planning considers the availability of resources, materials, and the knowledge of future demand.

In today's sophisticated manufacturing operations, production planning is critical. If no production planning is done, equipment will be unable to schedule precise production, limiting the operations' ability to work effectively and efficiently. This is why combining the right production planning system can be extremely advantageous, as it will lay the basis for how the product should function and identify areas where productivity is lacking.

## **2.5 Production Planning Techniques**

According to (Jeon and Kim, 2016), production is both a science and an art. It may make your operations run smoothly and your business profitable if done correctly. If done incorrectly, it can produce long-term problems for both employees and customers. Production planning techniques assist you in streamlining workflow and ensuring that work is completed on time and to specification. This procedure benefits the Company, its customers, and its staff, resulting in a win-win situation.

Production scheduling is controlling the logistics of the production process to ensure that work is completed on time and with minimal waste. To properly schedule production, you must first ensure that you have all of the necessary ingredients. If you don't have the items you need to finish a step in the process, you may have to shut down your entire operation until you get them, because subsequent phases may depend on the one that can't be finished.

For production to run well, an organization must also have staff planned effectively. There should be enough people on the floor for each stage of the process, and they must be adequately trained and skilled to complete the work.

## **2.6 Forecasting Techniques for Production Planning**

### *Forecasting Orders*

Suppose one can forecast upcoming orders reasonably closely, materials on hand, and the necessary staff scheduled to meet demand. Order forecasts can be based on seasonal fluctuations and patterns from previous years. They may also be tied to planned promotions that will foster interest in your products.

### *Forecasting Staff*

Order forecasts influence staffing forecasts. Knowing how much the organization needs to produce in a specific period will help calculate how many staffing hours will be required and ensure that the relevant workers are scheduled.

## **3. Methods**

### **3.1 Research Design**

The research followed a quantitative approach from a case study, with questionnaires being issued to all respondents. The quantitative technique was chosen because of the stability and consistency of the results obtained through questionnaires. For this study, the researcher employed a survey-based research design. In a survey-based research design, data is collected from individual respondents who have been identified as being knowledgeable about the data required and willing to provide it to the researcher, while also being well picked to represent a broader community.

### **3.2 Sample and population**

The study population included all production planning employees and their supervisors and managers in one of the South African manufacturing industries. A sample of 57 operational staff, 5 supervisors, 2 middle managers and 6 other staff members took part in the study.

### **3.3 Data collection**

Data was gathered using questionnaires that were administered to operational staff, supervisors, and middle management employees in the Company under study. The questionnaire contained different questions set up in a clear and precise format that came with clear and straightforward instructions on how to answer the questions.

The questionnaire highlighted the practices and techniques involved in production planning as well as the impact it has on the operational costs in the manufacturing industry.

### **3.4 Data analysis**

A descriptive approach has been used to present the data after being analyzed with SPSS 25. Microsoft Excel was also used to build to show graphs from the data collected from google form. Close-ended questions were used to facilitate the data collection and analysis. Measures of central tendencies such as the mean and the standard deviation have also been calculated using SPSS 25.

## **4 Results and Discussion**

### **4.1 Graphical Results**

#### **4.1.1 Respondent's Position in the Company**

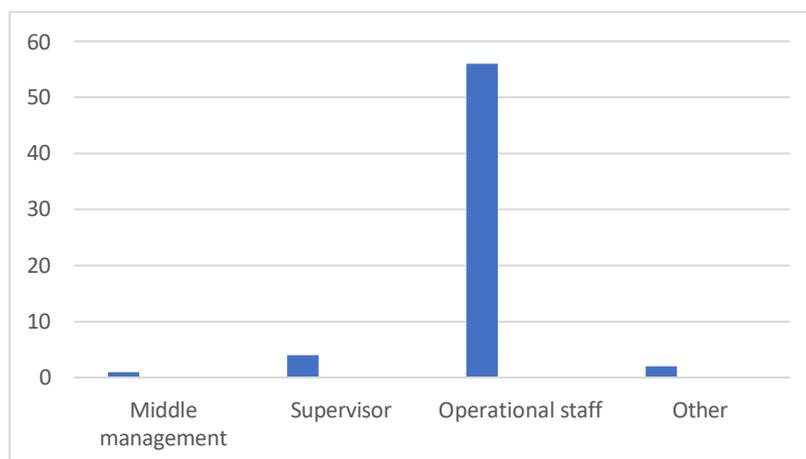


Figure 1. Respondent's Position

Figure 1 demonstrates that most responders (88.9%) are operational employees, which is understandable given that they are in charge of the Company's production. As a result, they are ideally positioned to supply the necessary production information. Production supervisors (6.3 percent) control the entire production process and, as one might imagine, they are infrequent in the organization.

#### 4.1.2 Duration of the respondents in the company

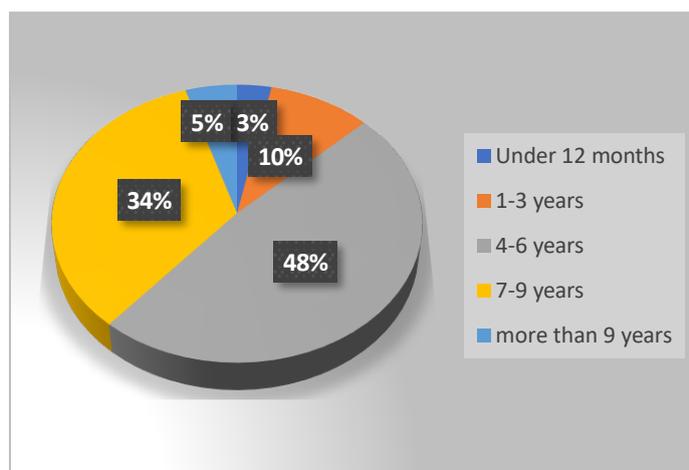


Figure 2. Duration in the Company

Figure 2 demonstrates that most respondents (48%) worked in the production department for four to six years, which is considered the average length of time an employee can work for the same organization. This also indicates that an individual can master their job in the workplace in four to six years and so have the necessary production knowledge. The respondents (34%) have worked in the production department for seven to nine years and have extensive experience in their field; consequently, they are ideal participants in this study because their responses can only be honest and reliable.

#### 4.1.3 Methods of production planning

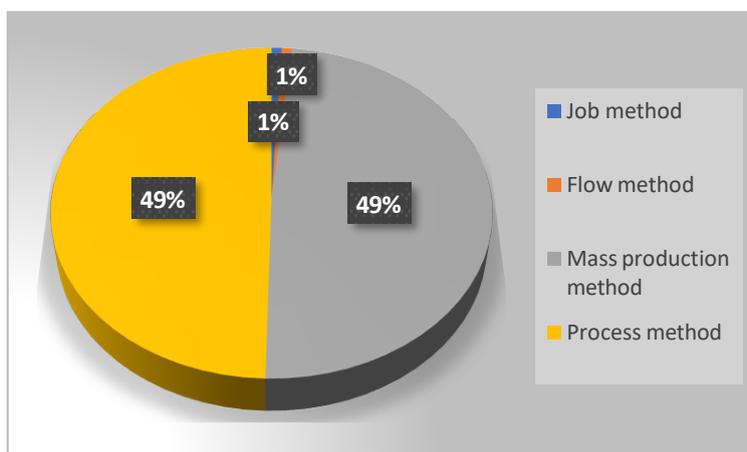


Figure 3. Methods of Production planning

Figure 3 illustrates that this Company only employs two of the four manufacturing methods, namely the process method (49 percent) and mass production method (50 percent) (49 percent). This is understandable given that their manufacturing line works with mass production and involves a variety of operations.

#### 4.1.4 Company production planning

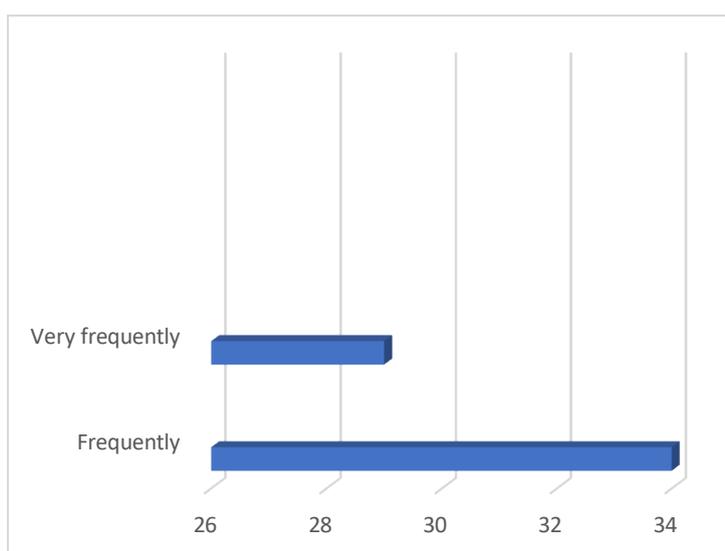


Figure 4. Company production planning frequency

Figure 4 shows that most respondents (34) say that production planning occurs regularly at the Company, followed by 29 respondents who say that the Company plans its output very frequently, indicating that the Company excels in production planning activities. As a result, there is no room for improvement in this area. The business is always on time.

#### 4.1.5 Production planning practices and techniques

Table 2. Production planning techniques used

Production planning practices (yes/no)			
	Yes	No	Total
Practice 1: This Company has an organizational setup created to prepare plans and policies	63	0	63
	100,0%	0	100,0%
Practice 2: This Company has staff trained for production planning and control procedures	62	1	63
	98,4%	1,6%	100,0%
Practice 3: The Company uses routing technique to determine exact path to be followed in the production	61	2	63
	96,8%	3,2%	100,0%
Practice 4: The Company uses scheduling technique to determine time and date	63	0	63
	100,0%	0	100,0%
Practice 5: This Company uses despatching technique to put the plan into effect	63	0	63
	100,0%	0	100,0%

The data in table 2 reveal that respondents use all practices, albeit at varying levels. Practices 1, 4, 5, 2, and 3 are the most commonly employed practices in sequence. One of the most commonly used practices is practice 1, which states that the Company has an organizational setup created to prepare plans and policies.

#### 4.2 Production planning practices Mean and Standard Deviation

Table 3. Production planning practices Mean and Standard Deviation

		The Company has organizational setup created to prepare plans and policies (PP1)	The Company has staff trained for production planning and control procedure (PP2)	The Company uses routing technique to determine exact path to be followed in Production (PP2)	The Company uses scheduling technique to determine time and date (PP3)	The Company uses despatching technique to put the plan into effect (PP3)
N	Valid	63	63	63	63	63
	Missing	0	0	0	0	0
Mean		4,48	3,41	3,87	4,13	4,17
Std. Deviation		0,535	0,663	0,523	0,458	0,459

With a mean value of 4,48, practice PP1 was the most frequently employed practice, according to Table 3. This frequent use indicates that having a well-organized company with well-prepared plans and policies appears to be a critical aspect in the overall planning of the manufacturing process. The next practice, PP5, has a mean value of 4,17, indicating that effectively applying a dispatching approach makes the production planning process substantially easier. PP4 is the third most popular practice, with a mean value of 4,13. This demonstrates how

important it is to use time and date when planning a product's manufacture. As a result, these findings are consistent with those in table 2.

### 4.3 Proposed Improvements

#### 4.3.1 Organizational setup

The study's overall findings reveal that all of the participants support the firm having an organization setup designed to prepare plans and policies, which is excellent because the organizational setup serves as the foundation for all of the Company's plans, including production planning. So, because the organization is performing so well in this area, the only advice is to keep upgrading the plans and rules and communicating them to the rest of the team.

#### 4.3.2 Staff training

According to the data, most respondents believe that training for manufacturing procedures and techniques is not usually provided to employees. This is bad for business because corporations place a higher emphasis on training, people need to be trained more frequently to accomplish their jobs correctly. As a result, the following suggestions can be implemented: a) Hold a quarterly training session for the entire team; b) Include the appropriate experts in those training sessions. c) Everyone involved in large-scale production activities must be capable and well-trained.

#### 4.3.3 Scheduling Technique

Almost everything that has to be done requires careful planning. With production planning being one of the most important aspects of production, the study demonstrates that the production department has a well-planned schedule that provides for a seamless flow of operations. As a result, the following suggestions can be implemented: a) Assist in the communication of accurate plans and schedules throughout the production department. b) Prior to the operation, plans and production schedules must be prepared. c) Appropriate communication about planned schedules between middle management and supervisors.

## 5. Conclusion

In conclusion, this study looked into the function of production planning procedures and methodologies in improving or influencing company performance in terms of operational costs in the Johannesburg manufacturing industry. Production planning approaches and techniques were discovered to have a significant impact on company performance metrics as well as total operating costs. The study's findings revealed that the practices and approaches were applied and significantly impacted the overall outcome. Although the results indicated that the production department was efficient, not every department area was efficient. The findings of these studies depict the general perspective of production planning in manufacturing companies in South Africa; as much as change may be challenging to adapt to, it is recommended that companies should put in place measures to improve their production planning procedures to remain competitive.

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